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(54) **BELT DRIVEN AXIAL FLOW PUMP WITH PULLEY BETWEEN TWO BEARINGS**

AXIALPUMPE MIT RIEMENANTRIEB UND RIEMENSCHEIBE ZWISCHEN ZWEI LAGER

POMPE AXIALE ENTRAÎNÉE PAR UNE COURROIE AVEC POULIE ENTRE DEUX PALIERS

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a pump housing, *inter alia* for use in a stabilizer system for a ship, in particular to a ship's anti heeling pump housing.

BACKGROUND OF THE INVENTION

[0002] When a ship during loading or unloading tilts to port or starboard and does not return back to its upright position it is known as heeling of the vessel. One reason of a ship's heeling is an uneven cargo load distribution during the cargo loading and unloading.

An anti-heeling system of a ship is configured to automatically detect the heeling angle of the ship and to compensate therefore. This allows the vessel to have a continuous loading and unloading cargo operation without paying too much attention to the cargo's load distribution on the ship which saves a considerable amount of time during a call to port. In addition, the anti-heeling system allows safer and rapid cargo loading and unloading, reduces damage to ramp, rolling cargo and containers and ensures safety of the ship and personnel.

In a water-pump anti-heeling system the ship's ballast tanks are internally connected to each other by means of pipes near the ship's keel, and by a pump system with an anti-heeling pump, automatic valves and control systems. When the ship heels to any of the sides, a heeling sensor sends a signal for a change of the ship's angle to a controller. Transferring of ballast tank water from the heeled side to the other side of the ship makes the vessel upright. The pump system typically comprises an electrical motor driven water pump, which is normally reversible to direct ballast water flow between tanks on either side of the ship.

It is a problem that the prior art anti-heeling pump systems are often difficult to service not only because of space constraints in the ship's engine room but also because of the design of the pumps. For some operations the prior art pump systems have shown not to be simple to maintain in operation, by not allowing a quick and simple access to internal components requiring regular service or replacement. Also, the running speed of the pump cannot be easily varied, limiting the versatility of the pumps.

German patent application no. 10 2010 056 393 discloses a pump operated by a belt extending in a secondary transverse passage. One problem with this pump is that it is suitable for relatively low-pressure operation only, being adapted for carrying a single propeller only and for a flow of liquid in a primary direction only. The flow passage has a reduced area at the inner housing with the pump axle, the pump outer housing having the same contour, giving rise to a high pressure drop. The secondary transverse passage is configured to allow for the belt to be pulled off the end of the axle and the axle does not extending past the secondary passage but has an axle end located within the secondary passage such that the belt engages the axle close to the axle end, potentially giving rise to higher transverse loads on one set of bearings than on the other set of bearings.

[0003] The document DE 24 36 578 A1 discloses in figures 1 and 2 a pump housing according to the preamble of claim 1.

OBJECT OF THE INVENTION

[0004] To solve the above problems, an object of the present invention is to provide an improved pump system which may allow for easy service, has few components requiring service, and which also takes up less space, such as a lesser part of the normally very constrained engine room space near the ship's keel.

[0005] This is achieved by providing a pump housing as defined in claim 1 which is usable together with a closed loop driving belt extending between the inside and the outside of the pump housing and which allows for easy access and replacement of internal components of the pump. The pump according to the invention provides for a transmission of a driving motor shaft rotation by the driving belt engaging a drive transmission structure, such as one releasably mounted coaxially around the pump axle. Replacing such an annular drive transmission structure with one of another diameter allows for a control of the speed of rotation of the pump axle using the same driving motor rotation speed. The driving belt runs in a secondary passage extending generally transverse to the flow passage of the pump between the ends of the pump axle, and has a width in the direction generally parallel with the flow passage which preferably corresponds essentially to the width of the second passage in that direction. Preferably both ends of the pump axle extend into the flow passage, allowing them to be fitted with a respective propeller whenever a particular high pressure is required, such as is sometimes the case for anti-heeling systems. In such a case the pump will normally include dynamic axle seals near each of the axle ends, and the second/secondary passage will then be located between the dynamic axle seals.

[0006] The second/secondary passage width is preferably chosen to allow for accommodation of the driving belt with some play; by way of example, when the pump is designed to operate with a driving belt having a 90 mm width the width of the secondary passage will typically be in the order of 110 mm - 130 mm, or exceeding only slightly the width of the belt. Preferably the secondary passage extends between two peripherally spaced apart openings in an outer housing of the pump, such as at different locations in a cross-sectional plane, along the circumference of the outer housing. Preferably, the outer housing and an inner housing may be integrally formed.

[0007] By the pump outer housing having a generally enlarged dimension, eg. a bulbous shape, between the ends of the pump, the pump housing preferably having circular cross-sections, the pump water flow passage

may have the same or essentially the same total cross-sectional area compared to that of the piping connected to the pump, thereby providing a limited flow resistance. The pump may be configured with an essentially symmetrical geometry about a central plane transverse to the pump axle, providing similar hydraulic properties irrespectively of the direction of flow through the pump.

[0008] Replacing a belt may be done by cutting it, then inserting a strip of belt material into the secondary passage, and then splicing the ends of the belt material to form a closed loop belt. According to the invention, the pump housing is in two parts with the secondary passage opening up in the axial direction of the pump upon the two parts being separated, allowing replacement of the driving belt and of the axle bearings.

BRIEF DESCRIPTION OF THE FIGURES

[0009] The invention will now be described in more detail with regard to the accompanying figures. The figures show one way of implementing the present invention and is not to be construed as being limiting to other possible embodiments falling within the scope of the attached claim set.

Fig. 1a is schematic view of a ship during unloading,
Fig. 1b is a perspective view of a pump and motor combination according to the invention,
Fig. 2 is a cross-sectional view of the combination of fig. 1b,
Fig. 3 is a longitudinal sectional view of the pump of fig. 2, taken along line B-B of fig. 2,
Fig. 4 is a longitudinal sectional view of the pump of fig. 2, taken along line C-C of fig. 2,
Fig. 5 is a perspective view showing only the axle and drive transmission structure of the pump of fig. 1b,
Fig. 6 is a perspective view of one part of the pump, and
Fig. 7 is a longitudinal view of an alternative embodiment of the pump of fig. 2.

DETAILED DESCRIPTION OF AN EMBODIMENT

[0010] Fig. 1a shows a ship S in the process of being unloaded at a port. The drawing shows how the ship S may tilt towards one side during a non-symmetrical unloading, and for which reason the ship is conventionally equipped with an anti-heeling stabilizer mechanism that seeks to maintain a perfectly upright position of the ship. The stabilizer mechanism conventionally includes a motor driven pump P connected to opposite ballast water tanks T1 and T2 by pipes 8. As the ship S tilts to one side the stabilizer mechanism activates the pump P to deliver water from one tank T1 to the other tank T2, or vice versa. The motor, pump P and the pipes 8 are located close to the keel and should take up as little space as possible. Often several such stabilizer mechanisms are arranged along the ship's length.

[0011] Shown in fig. 1b is a cast metal pump and motor combination as discussed above and in accordance with the present invention. The pump may be moulded of any other material. This combination includes a drive belt 15 driven by an output shaft 12 of the motor M and connected with the pump 20. Opposite flanges 26, 26' serve to connect the pump 20 to a respective pipe 8. As will be discussed further below the belt 15 engages a drive transmission structure within the pump 20, the belt 15 and drive transmission structure providing upon rotation of the output shaft 12 a rotation of an impeller 105 connected to the end of a pump axle mounted in the pump housing H and having opposite ends A, B, respectively. When mounted in position in the ship's S hull the output shaft 12 extends essentially parallel with the pump axle. A suitable frame (not shown) may be configured to carry the pump 20 and the motor M and to be mounted to the ship's hull; the motor M may be mounted on the frame F to allow for the distance between the motor M and the pump 20 to be varied, such as for changing the driving belt tension.

[0012] Where the pump is used as part of a ship's anti-heeling system the aforementioned rotation of the impeller 105 sets up a flow of ballast water along a flow passage 22 that extends inside the pump 20 between the opposite ends 24, 25 of the pump 20, between the tanks T1 and T2. A second passage 80 separate from the flow passage 22 extends generally transversally to the pump axle and receives the driving belt 15. The second passage 80 preferably has a width in the direction between the opposite ends 24, 25 of at least 40 mm, in any event corresponding to the width of the driving belt 15 required for operation of the pump. The driving belt 15 may be a rubber belt such as a belt made of reinforced synthetic rubber.

[0013] Fig. 2 is a cross-sectional view of the pump and motor combination of fig. 1b, showing the driving belt 15 extending around the drive transmission structure 90 inside the pump 20. With a bulbous design of the outer pump housing H the cross-sectional area of the flow passage 22 throughout the length of the pump 20 may be the same as that of the pipes 8 at the opposite flanges 26, 26'.

[0014] As seen best in figs. 2-4 the pump 20 comprises an inner housing 60 inside an outer housing 30, and the flow passage 22 extends between the outer housing 30 and the inner housing 60, between the opposite ends 24, 25 of the pump 20. In the inner housing 60 a throughgoing passage 29 extends in the direction between the opposite ends 24, 25 and is configured for receiving a portion of the impeller axle 100 as well as the drive transmission structure 90 which is connected with or integral with the axle 100. The view of fig. 2 is as shown by line A-A in fig. 4.

[0015] The outer housing 30 defines together with the inner housing 60 the aforementioned second passage 80 which communicates with the outside of the outer housing 30 and extends around the drive transmission

structure 90. As seen best in figs. 2 and 6 the second passage 80 is defined in part by the through-going passage 29 and so extends around the drive transmission structure 90 opposite two peripherally spaced apart openings 82, 84 in the outer housing 30, each opening 82, 84 defining a respective end of the second passage 80. Shown also in fig. 2 is a plurality of radially directed walls 23 that connect the inner housing 60 with the outer housing 30; the walls 23 are preferably integral with the inner housing 60 and the outer housing 30 and split up the flow passage 22 into longitudinal segments 22' as shown in fig. 2, the sum of the cross-sectional areas of the respective segments 22' defining the total cross-sectional area of the flow passage 22.

[0016] As the skilled person will readily understand the dimension of the second passage 80 between the opposite walls 23 that define the second passage 80, as shown by way of example in fig. 2, is such as to accommodate, with some play, for a driving belt 15 having a suitable thickness, and also where appropriate to allow for the use of a smaller diameter annular transmission drive structure 90 where the spacing between opposite lower parts of the belt 15 shown in fig. 2 would be smaller.

[0017] Shown also in figs. 2 and 5 is a toothing 92 of the annular drive transmission structure 90 engaging a toothing 16 of the driving belt 15 that is received in the second passage 80. Fig. 5 is a view showing only the axle 100 and an exemplary form of the drive transmission structure 90 also shown in fig. 2 wherein the drive transmission ring is coaxially and releasably mounted to the axle 100, such as by a taper lock. The selected diameter of the ring allows for a selection of a given speed of rotation of the pump axle 100 in accordance with the speed of rotation of the motor output shaft 12. The belt 15 may alternatively engage the axle 100 directly, and may alternatively be configured for frictional engagement with a V-shaped notch of the drive transmission structure 90. The driving belt may by way of example alternatively be a V-belt working with the aforementioned V-shaped notch, and several individual belts may be used next to each other where this is deemed appropriate. According to the invention, and as seen best in figs. 3 and 4, the outer housing 30 comprises two parts, namely a first outer housing part 36 in extension of a second outer housing part 42 in the direction of the axle 100. The two outer housing parts 36, 42 are releasably connected to each other by opposite flanges 40, 70 to form a seal along a peripheral region 21 around the flow passage 22. In addition, the first outer housing part 36 is integrally connected with a first inner housing part 66 and the second outer housing part 42 is integrally connected with a second inner housing part 72, arranged in extension of the first inner housing part 66 in the direction of the axle 100. The two inner housing parts are releasably sealed against each other along a peripheral region 61 around the axle 100, this seal being established as the two outer housing parts 36, 42 are connected to each other. As shown in fig. 6 the second passage 80 may extend only in the second inner housing part 72, being open towards the first inner housing part 66. This allows for an easy replacement of the driving belt 15 when worn down in that the pump 20 is first disconnected from the pipes 8 and one impeller 105 removed from the axle 100, following which the two outer housing parts 36, 42 with respective inner housing parts are separated from each other, allowing the belt 15 to be pulled laterally out of the passage 80 and to be replaced.

[0018] It is noted that, as shown in fig. 3 the pump axle 100 may carry an impeller 105 at each end, and the impeller is such that rotation of the axle 100 in the opposite direction by opposite rotation of the output shaft 12 will bring about an opposite liquid flow through the pump 20. Upon mounting the impellers 105 a dynamic axle seal 170 is compressed. Bearings 160 are configured to support the axle 100 laterally, taking into account lateral forces applied on the axle 100 by the belt 15. In addition, as shown in fig. 4 various cross-bores may be provided for circulating cooling water flowing through the pump 20. An indicator cross-bore 162 may be provided downstream of a chamber 161 in front of a packing. Water from the chamber 161 exiting the bore 162 is an indication that the packing is worn down and that the packing should be replaced by dissembling the pump 20 as described above.

[0019] Fig. 7 shows an variation wherein the pump carries an impeller 105 at one axle end B only, the inner housing 60 having a closure portion 200 opposite that one end B to seal the inside of the inner housing 60 in relation to the flow passage 22 opposite the end B. This embodiment is useful where low-pressure operations only are anticipated; the same basic elements as described above may be used in combination with a shortened length axle 60.

[0020] Although the present invention has been described in connection with the specified embodiments, it should not be construed as being in any way limited to the presented examples. The scope of the present invention is set out by the accompanying claim set. The invention is not specific to the use of the pump for anti-heeling purposes, but for any purpose where a pump as shown in the drawing figs. 1b-7 is useful. In the context of the claims, the terms "comprising" or "comprises" do not exclude other possible elements or steps. Also, the mentioning of references such as "a" or "an" etc. should not be construed as excluding a plurality. The use of reference signs in the claims with respect to elements indicated in the figures shall also not be construed as limiting the scope of the invention.

Claims

1. A ship's anti heeling pump housing (H), said housing (H) comprising an outer housing (30) and an inner housing (60) inside said outer housing (30), a liquid flow passage (22) between said outer housing (30)

and said inner housing (60) extending between opposite ends (24, 25) of said pump housing (H), a through-going passage (29) extending in the direction between said opposite ends (24, 25) being configured for receiving a portion of an impeller axle (100), said outer housing (30) defining together with said inner housing (60) a second passage (80) separate from said liquid flow passage (22), said second passage (80) extending generally transversally to said through-going passage (29) and communicating with the outside of said outer housing (30) and with said through-going passage (29), said outer housing (30) comprising a first outer housing part (36) arranged in extension of a second outer housing part (42) in the direction between said opposite ends (24, 25), said first outer housing part (36) being releasably connected to said second outer housing part (42), said first outer housing part (36) supporting a first inner housing part (66) and said second outer housing part (42) supporting a second inner housing part (72), said first inner housing part (66) being arranged in extension of said second inner housing part (72) in the direction between said opposite ends (24, 25), said second passage (80) being in said second inner housing part (72),
the pump housing being **characterised in that** said second passage (80) is open towards said first inner housing part (66) along the whole length of the second passage (80).

2. The pump housing according to claim 1, said outer housing (H, 30) having an enlarged dimension between said ends (24, 25) of said pump (20), to provide for said flow passage (22) having the same or essentially the same total cross-sectional area compared to the cross-sectional area of said flow passage (22) at said ends (24, 25) of said pump (20).

3. The pump housing according to any of the preceding claims, said first outer housing part (36) and said second outer housing part (42) having a respective flange (40, 70), said respective flanges (40, 70) being releasably connected to establish seals between said first outer housing part (36) and said second outer housing part (42) and between said first inner housing part (66) and said second inner housing part (72).

4. A pump comprising the pump housing according to any one of the preceding claims, said pump further comprises a portion of an axle (100) extending inside said inner housing (60), said axle (100) having a first axle end (A) and a second axle end (B) and carrying at least one impeller (105) for establishing a flow of a liquid along said flow passage (22), a drive transmission structure (90) in said inner housing (60) being connected with or integral with said axle (100), said second passage (80) further communicating with the outside at at least one opening (82, 84) and extending around said drive transmission structure (90) opposite to said opening (82, 84), said axle (100) extending past said second passage (80) towards each of said ends (24, 25) of said pump (20), and said second passage (80) being located between bearings (160) for said axle (100).

5. The pump of claim 4, carrying an impeller (105) at said first axle end (A) and at said second axle end (B).

6. The pump according to claim 4 or 5, said second passage (80) being configured for receiving an essentially flat driving belt (15) extending from said outside to engage said drive transmission structure (90) opposite said at least one opening (82, 84).

7. The pump according to any of the preceding claims, said drive transmission structure being a ring (90) coaxial with said axle (100), said ring (90) being releasably connected with said axle (100), and said ring (90) comprising a tooting (92) or a V-shaped notch.

Patentansprüche

1. Gehäuse (H) einer Antikrängungspumpe eines Schiffs, das Gehäuse (H) umfassend ein äußeres Gehäuse (30) und ein inneres Gehäuse (60) innerhalb des äußeren Gehäuses (30), ein Flüssigkeitsstromdurchlass (22) zwischen dem äußeren Gehäuse (30) und dem inneren Gehäuse (60), der zwischen gegenüberliegenden Enden (24, 25) des Pumpengehäuses (H) verläuft, einen durchlaufenden Durchlass (29), der in der Richtung zwischen den gegenüberliegenden Enden (24, 25) verläuft, konfiguriert zum Empfangen eines Abschnitts einer Flügelradachse (100), wobei das äußere Gehäuse (30) zusammen mit dem inneren Gehäuse (60) einen zweiten Durchlass (80) definiert, der von dem Flüssigkeitsstromdurchlass (22) getrennt ist, wobei der zweite Durchlass (80) im Allgemeinen quer zu dem durchlaufenden Durchlass (29) verläuft und mit der Außenseite des äußeren Gehäuses (30) und mit dem durchlaufenden Durchlass (29) in Verbindung steht, das äußere Gehäuse (30) umfassend einen ersten Teil (36) des äußeren Gehäuses, der in Verlängerung eines zweiten Teils (42) des äußeren Gehäuses in der Richtung zwischen den gegenüberliegenden Enden (24, 25) angeordnet ist, wobei der erste Teil (36) des äußeren Gehäuses abnehmbar mit dem zweiten Teil (42) des äußeren Gehäuses verbunden ist, wobei der erste Teil (36) des äußeren Gehäuses einen ersten Teil (66) des inneren Gehäuses stützt und der zweite Teil (42) des äußeren Gehäuses einen zweiten Teil (72) des inneren Gehäuses stützt, wobei der erste Teil (66) des inneren

Gehäuses in Verlängerung des zweiten Teils (72) des inneren Gehäuses in der Richtung zwischen den gegenüberliegenden Enden (24, 25) angeordnet ist, wobei sich der zweite Durchlass (80) in dem zweiten Teil (72) des inneren Gehäuses befindet, wobei das Pumpengehäuse **dadurch gekennzeichnet ist, dass** der zweite Durchlass (80) gegen den ersten Teil (66) des inneren Gehäuses entlang der gesamten Länge des zweiten Durchlasses (80) offen ist.

2. Pumpengehäuse nach Anspruch 1, wobei das äußere Gehäuse (H, 30) eine verlängerte Abmessung zwischen den Enden (24, 25) der Pumpe (20) hat, um für den Stromdurchlass (22) vorzusehen, dass er die gleiche oder im Wesentlichen die gleiche Gesamtquerschnittsfläche im Vergleich zu der Querschnittsfläche des Stromdurchlasses (22) an den Enden (24, 25) der Pumpe (20) hat.

3. Pumpengehäuse nach einem der vorstehenden Ansprüche, wobei der erste Teil (36) des äußeren Gehäuses und der zweite Teil (42) des äußeren Gehäuses einen entsprechenden Flansch (40, 70) hat, wobei die entsprechenden Flansche (40, 70) abnehmbar verbunden sind, um Abdichtungen zwischen dem ersten Teil (36) des äußeren Gehäuses und dem zweiten Teil (42) des äußeren Gehäuses und zwischen dem ersten Teil (66) des inneren Gehäuses und dem zweiten Teil (72) des inneren Gehäuses herzustellen.

4. Pumpe umfassend das Pumpengehäuse nach einem der vorstehenden Ansprüche, wobei die ferner einen Abschnitt einer Achse (100) umfasst, die im Inneren des inneren Gehäuses (60) verläuft, wobei die Achse (100) ein erstes Achsenende (A) und ein zweites Achsenende (B) hat und zumindest einen Flügelrad (105) zum Herstellen einer Strömung einer Flüssigkeit entlang des Stromdurchlasses (22) trägt, wobei eine Antriebsübertragungsstruktur (90) in dem inneren Gehäuse (60) mit der Achse (100) verbunden oder in diese integriert ist, wobei der zweite Durchlass (80) ferner mit der Außenseite an zumindest einer Öffnung (82, 84) in Verbindung steht und um die Antriebsübertragungsstruktur (90) gegenüber der Öffnung (82, 84) verläuft, wobei die Achse (100) hinter dem zweiten Durchlass (80) gegen jeden der Enden (24, 25) der Pumpe (20) verläuft und der zweite Durchlass (80) sich zwischen Lagern (160) für die Achse (100) befindet.

5. Pumpe nach Anspruch 4, einen Flügelrad (105) an dem Ende (A) der ersten Achse und dem Ende (B) der zweiten Achse tragend.

6. Pumpe nach Anspruch 4 oder 5, wobei der zweite Durchlass (80) zum Empfangen eines im Wesentlichen flachen Antriebsriemens (15), der von der Außenseite verläuft, konfiguriert ist, um die Antriebsübertragungsstruktur (90) gegenüber der zumindest einen Öffnung (82, 84) eingreifen zu lassen.

7. Pumpe nach einem der vorstehenden Ansprüche, wobei die Antriebsübertragungsstruktur ein Ring (90) koaxial zu der Achse (100) ist, wobei der Ring (90) abnehmbar mit der Achse (100) verbunden ist und der Ring (90) eine Verzahnung (92) oder eine V-förmige Einkerbung umfasst.

Revendications

1. Bâti de pompe anti-inclinaison (H) d'un navire, ledit bâti (H) comprenant un bâti extérieur (30) et un bâti intérieur (60) à l'intérieur dudit bâti extérieur (30), un passage d'écoulement de liquide (22) entre ledit bâti extérieur (30) et ledit bâti intérieur (60) s'étendant entre les extrémités opposées (24, 25) dudit bâti de pompe (H), un passage traversant (29) s'étendant selon la direction entre lesdites extrémités opposées (24, 25) configuré pour recevoir une partie d'un essieu de rotor (100), ledit bâti extérieur (30) définissant ensemble avec le bâti intérieur (60) un second passage (80) séparé dudit passage d'écoulement de liquide (22), ledit second passage (80) s'étendant généralement transversalement audit passage traversant (29) et communiquant avec l'extérieur dudit bâti extérieur (30) et avec ledit passage traversant (29), ledit bâti extérieur (30) comprenant une première partie de bâti extérieur (36) disposée dans le prolongement d'une seconde partie de bâti (42) selon la direction entre lesdites extrémités opposées (24, 25), ladite première partie de bâti extérieur (36) étant raccordée de façon libérable à ladite seconde partie de bâti extérieur (42), ladite première partie de bâti extérieur (36) supportant une première partie de bâti intérieur (66) et ladite seconde partie de bâti extérieur (42) supportant une seconde partie de bâti intérieur (72), ladite première partie de bâti intérieur (66) étant disposée dans le prolongement de ladite seconde partie de bâti intérieur (72) selon la direction entre lesdites extrémités opposées (24, 25), ledit second passage (80) étant dans ladite seconde partie de bâti intérieur (72), ledit bâti de pompe étant **caractérisé en ce que** ledit second passage (80) est ouvert vers ladite première partie de bâti intérieur (66) sur toute la longueur du second passage (80).

2. Bâti de pompe selon la revendication 1, ledit bâti extérieur (H, 30) possédant une dimension élargie entre lesdites extrémités (24, 25) de ladite pompe (20) afin de fournir ledit passage d'écoulement (22) possédant la même ou pratiquement la même aire de section transversale totale par rapport à la aire de section transversale dudit passage d'écoulement (22) au niveau desdites extrémités (24, 25) de ladite

pompe (20).

3. Bâti de pompe selon l'une quelconque des revendications précédentes, ladite première partie de bâti extérieur (36) et ladite seconde partie de bâti extérieur (42) possédant une bride respective (40, 70), lesdites brides respectives (40, 70) étant raccordées de façon libérable afin d'établir des joints d'étanchéité entre ladite première partie de bâti extérieur (36) et ladite seconde partie de bâti extérieur (42) et entre ladite première partie de bâti intérieur (66) et ladite seconde partie de bâti intérieur (72).

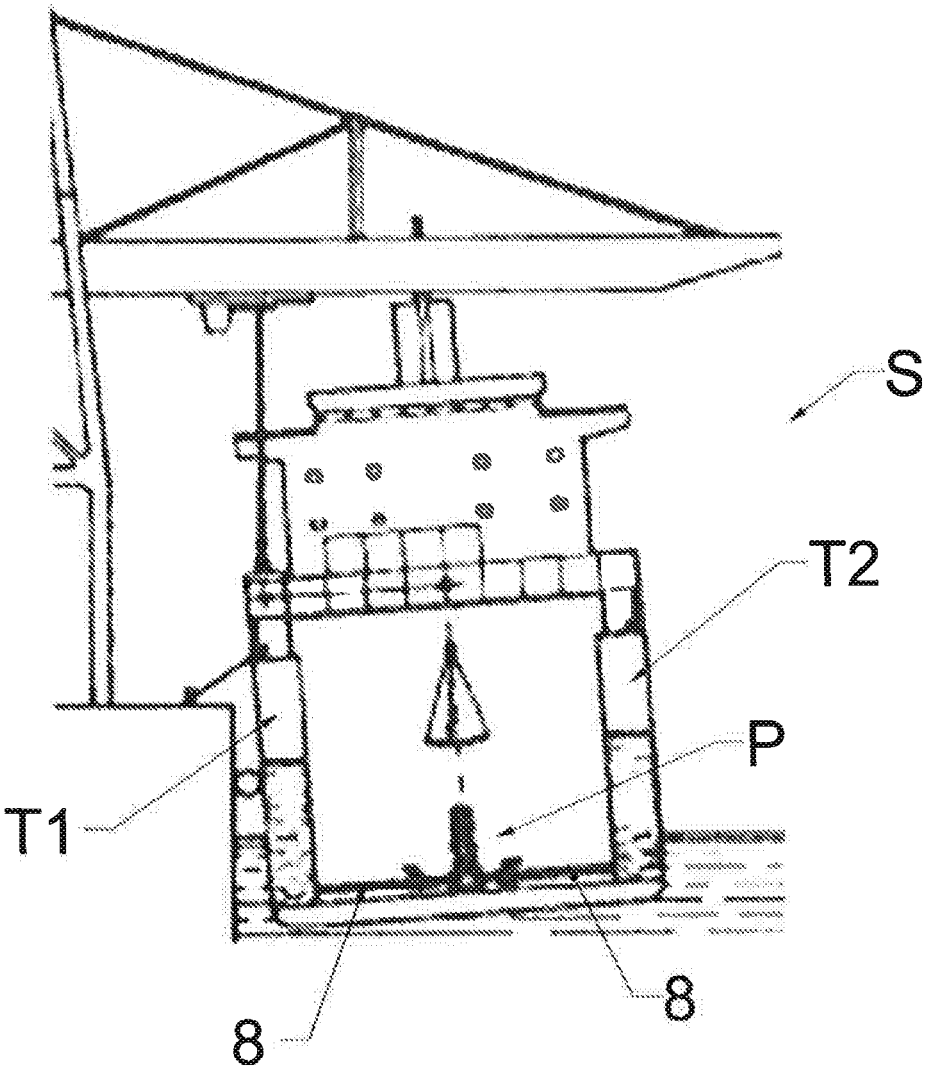
4. Pompe comprenant le bâti de pompe selon l'une quelconque des revendications précédentes, ladite pompe comprenant en outre une partie d'un essieu (100) s'étendant à l'intérieur dudit bâti intérieur (60) ledit essieu (100) possédant une première extrémité d'essieu (A) et une seconde extrémité d'essieu (B) et portant au moins une roue à ailettes (105) pour établir un écoulement de liquide le long dudit passage d'écoulement (22), une structure de transmission d'entraînement (90) dans ledit bâti intérieur (60) étant raccordé ou réalisée d'une seule pièce avec ledit essieu (100), ledit second passage (80) communicant en outre avec l'extérieur au niveau d'au moins une ouverture (82, 84) et s'étendant autour de ladite structure de transmission d'entraînement (90) en face à ladite ouverture (82, 84), ledit essieu (100) s'étendant au-delà dudit second passage (80) vers chacune desdites extrémités (24, 25) de ladite pompe (20) et ledit second passage (80) se situant entre les paliers (160) pour ledit essieu (100).

5. Pompe selon la revendication 4, portant une roue à ailettes (105) au niveau de ladite première extrémité (A) de l'essieu et au niveau de ladite seconde extrémité (B) de l'essieu.

6. Pompe selon la revendication 4 ou 5, ledit second passage (80) étant configuré pour recevoir une courroie d'entraînement (15) sensiblement plate s'étendant à partir dudit extérieur pour venir en prise avec ladite structure de transmission d'entraînement (90) den face à ladite au moins une ouverture (82, 84).

7. Pompe selon l'une quelconque des revendications précédentes, ladite structure de transmission d'entraînement étant un anneau (90) coaxial avec ledit essieu (100), ledit anneau (90) étant relié de manière libérable audit essieu (100) et ledit anneau (90) comprenant une denture (92) ou une encoche en forme de V.

Fig. 1a



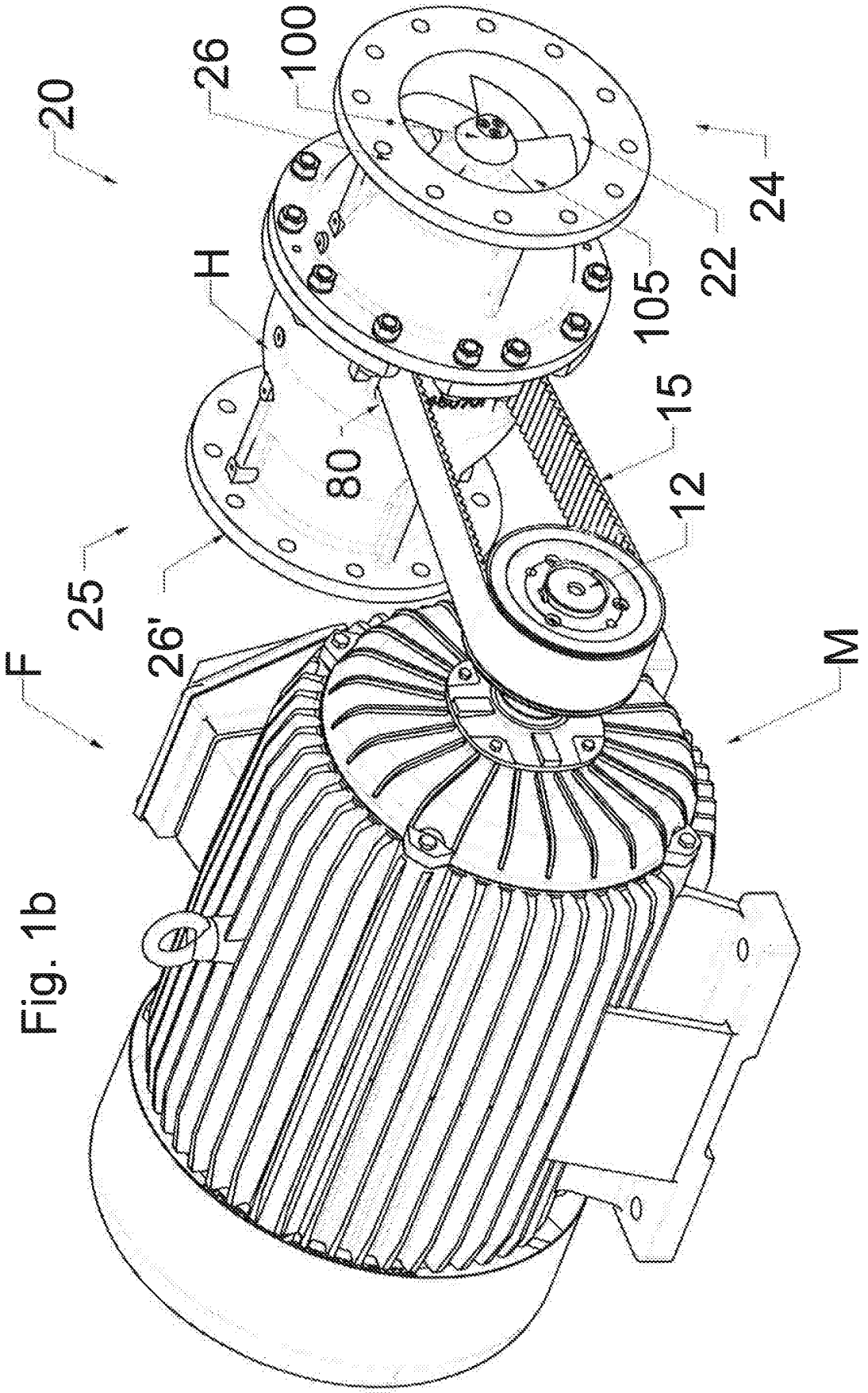
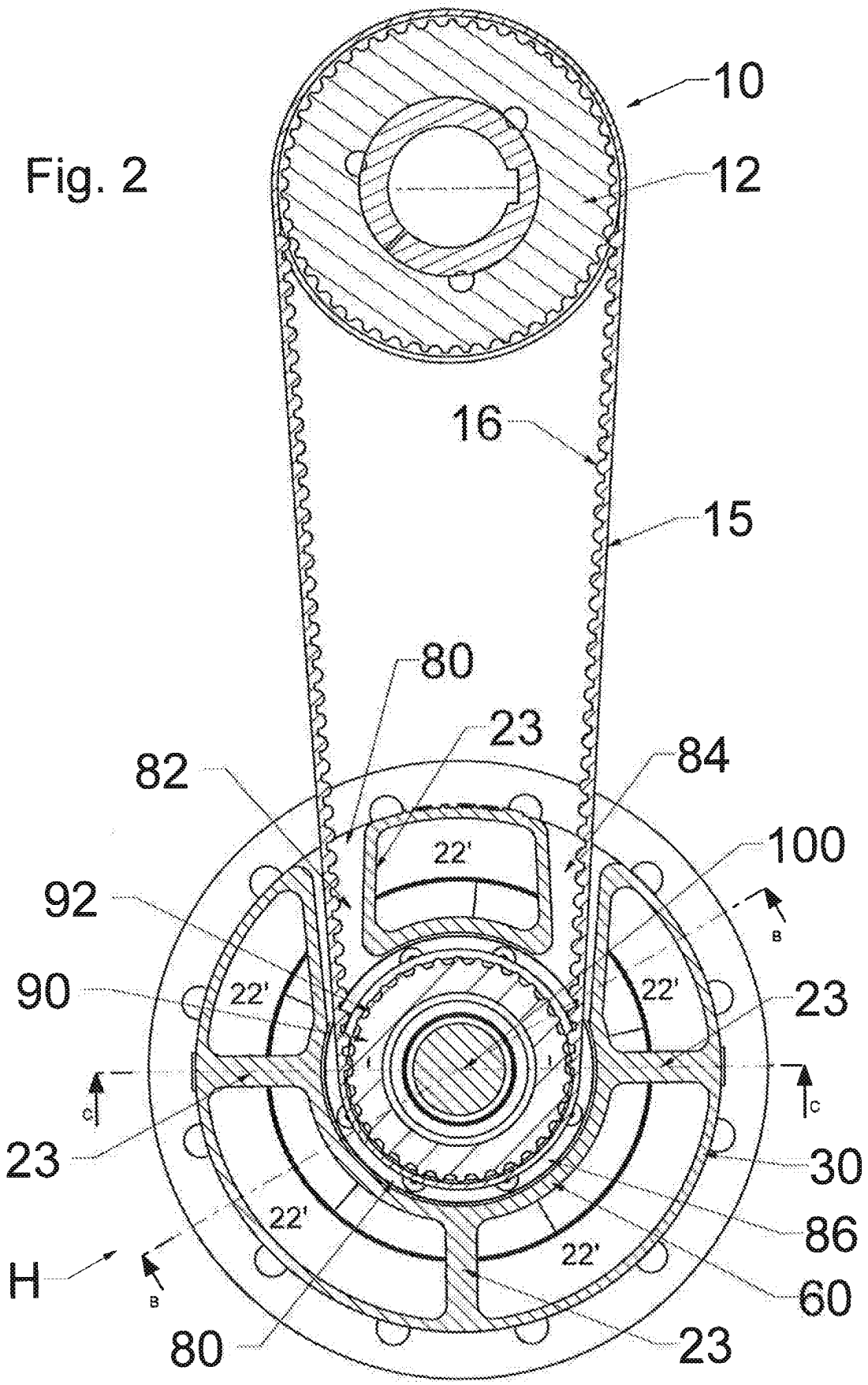


Fig. 1b

Fig. 2


10
12
16
15
80
23
82
84
22'
100
92
B
90
22'
22'
23
C
23
30
86
22'
22'
H
B
60
80
23

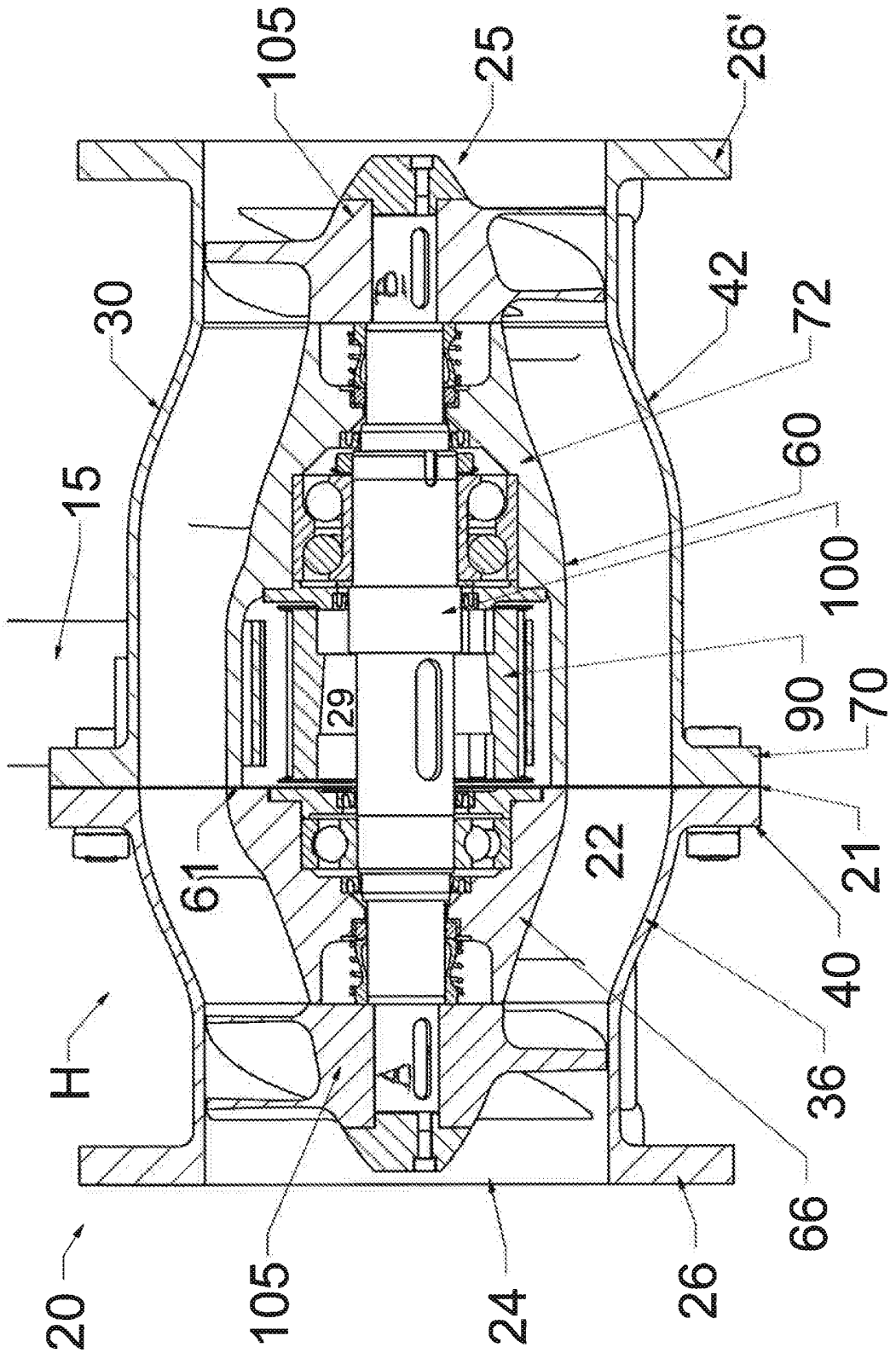


Fig. 3

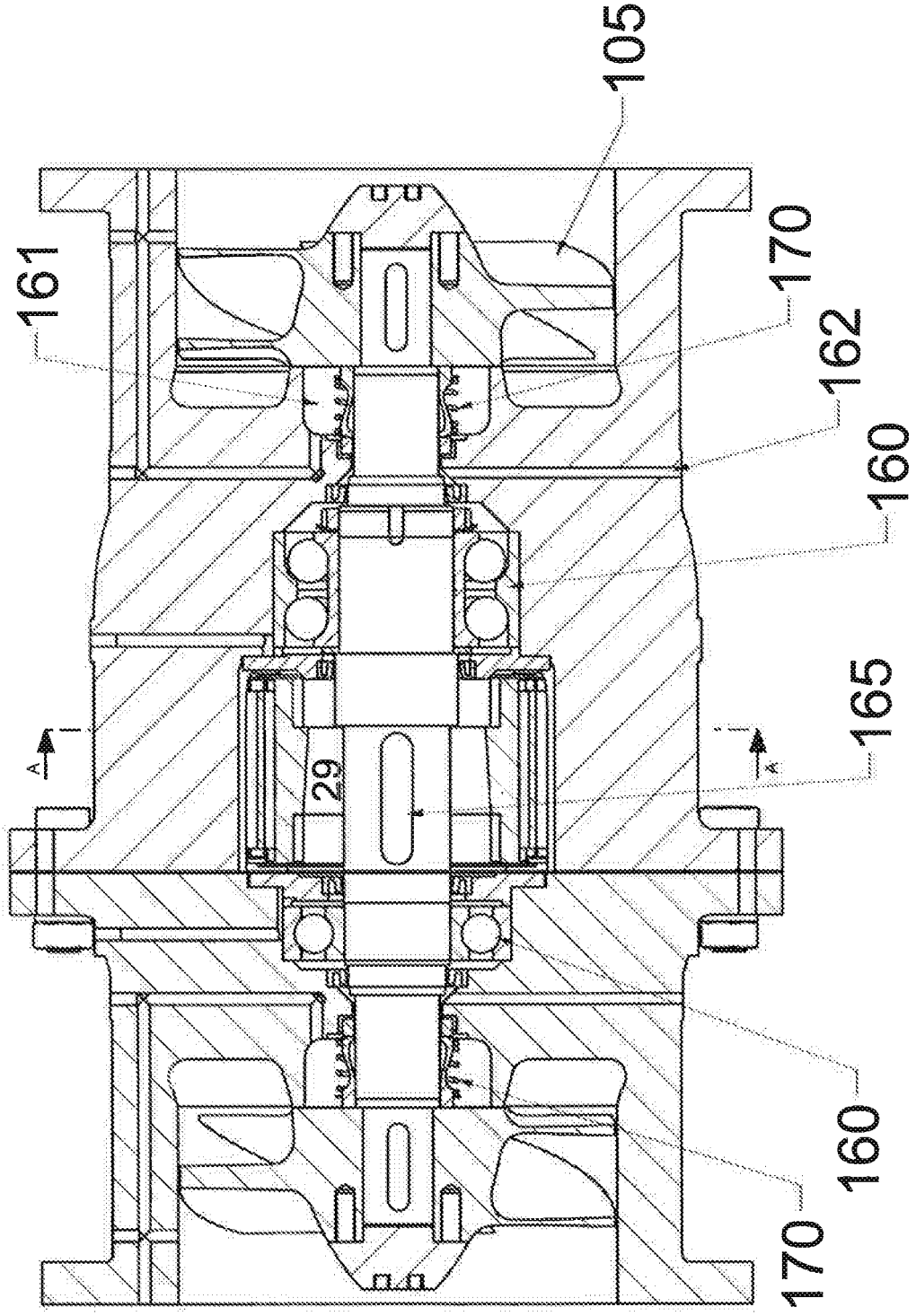


Fig. 4

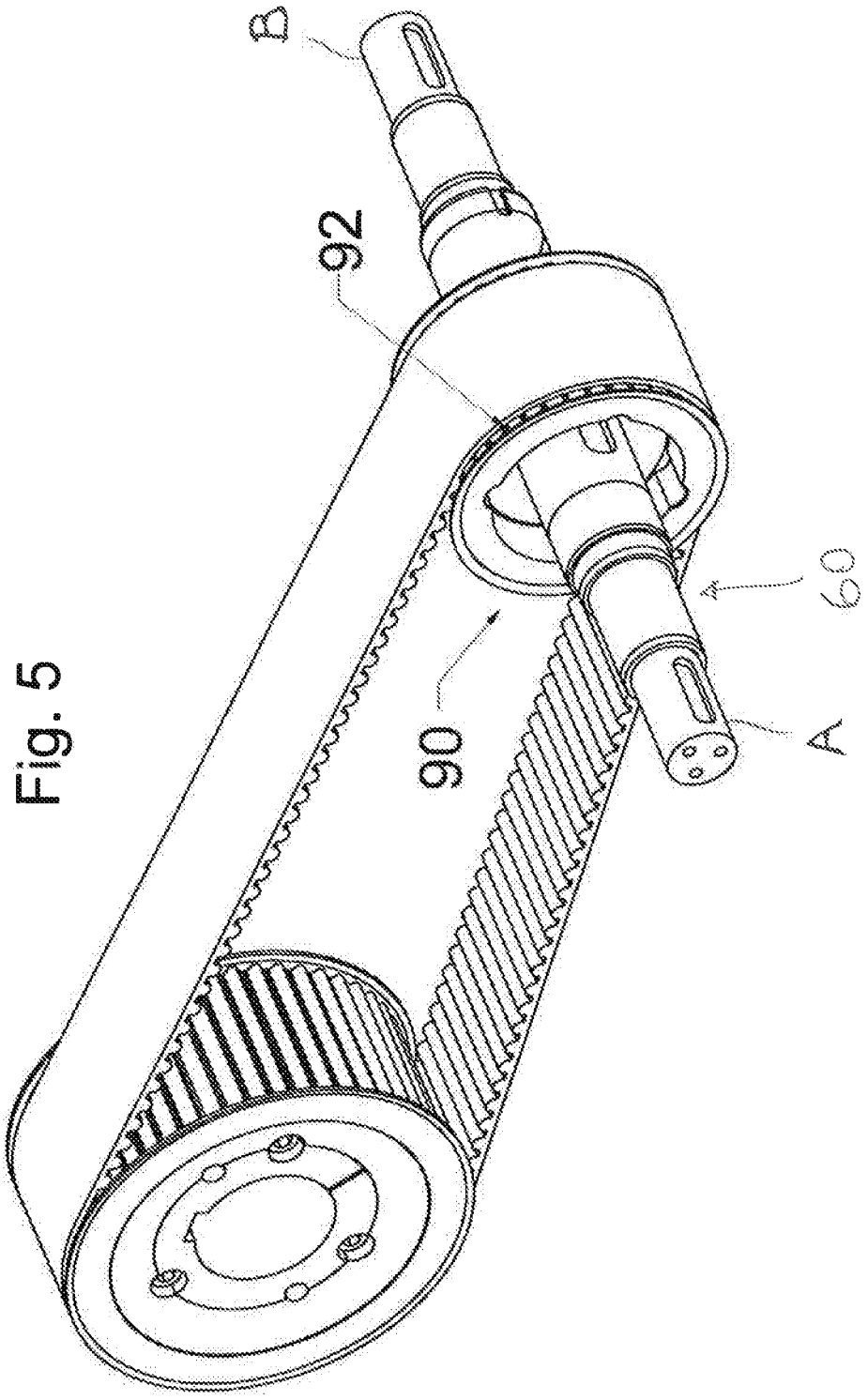


Fig. 5

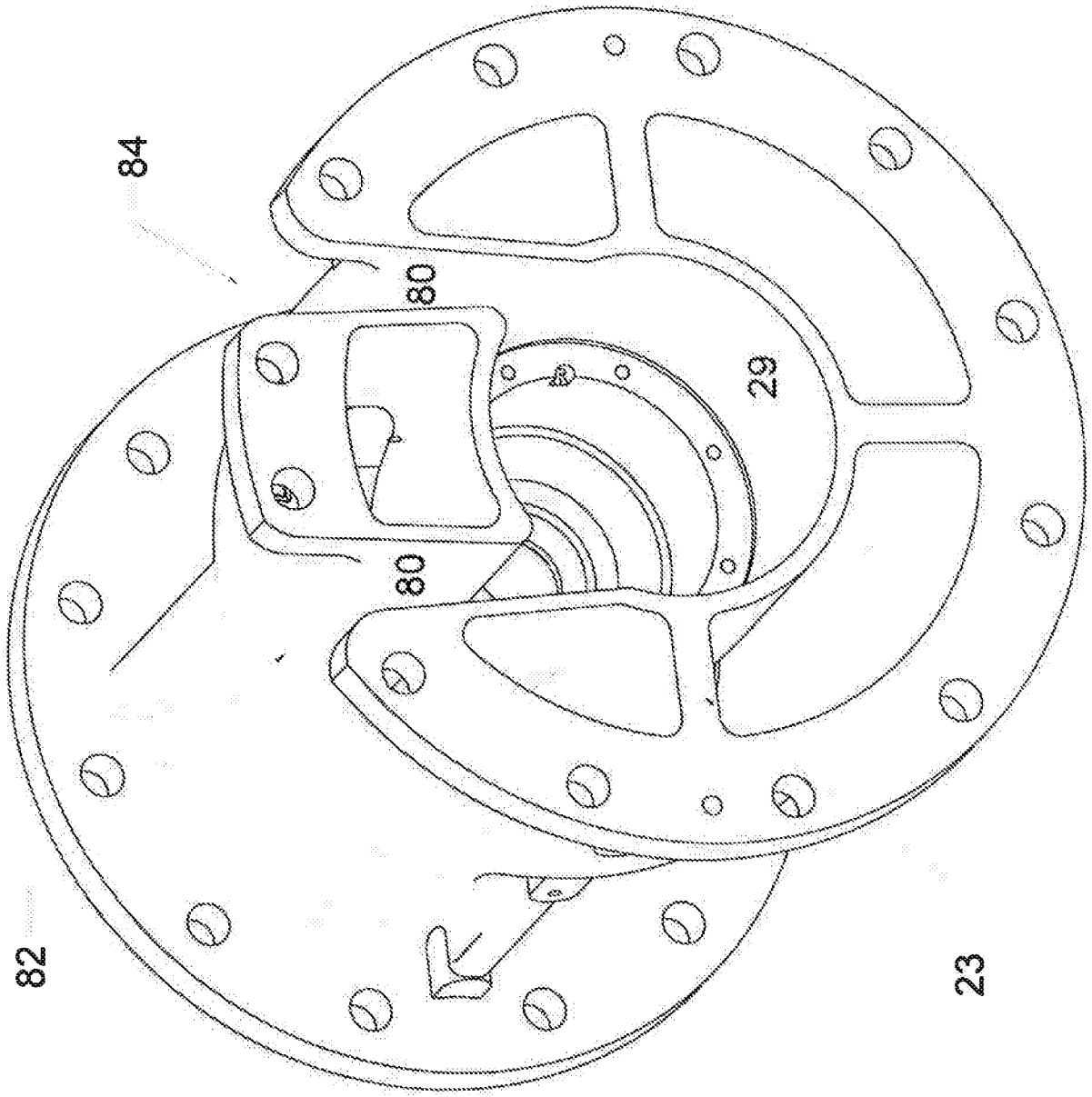


Fig. 6

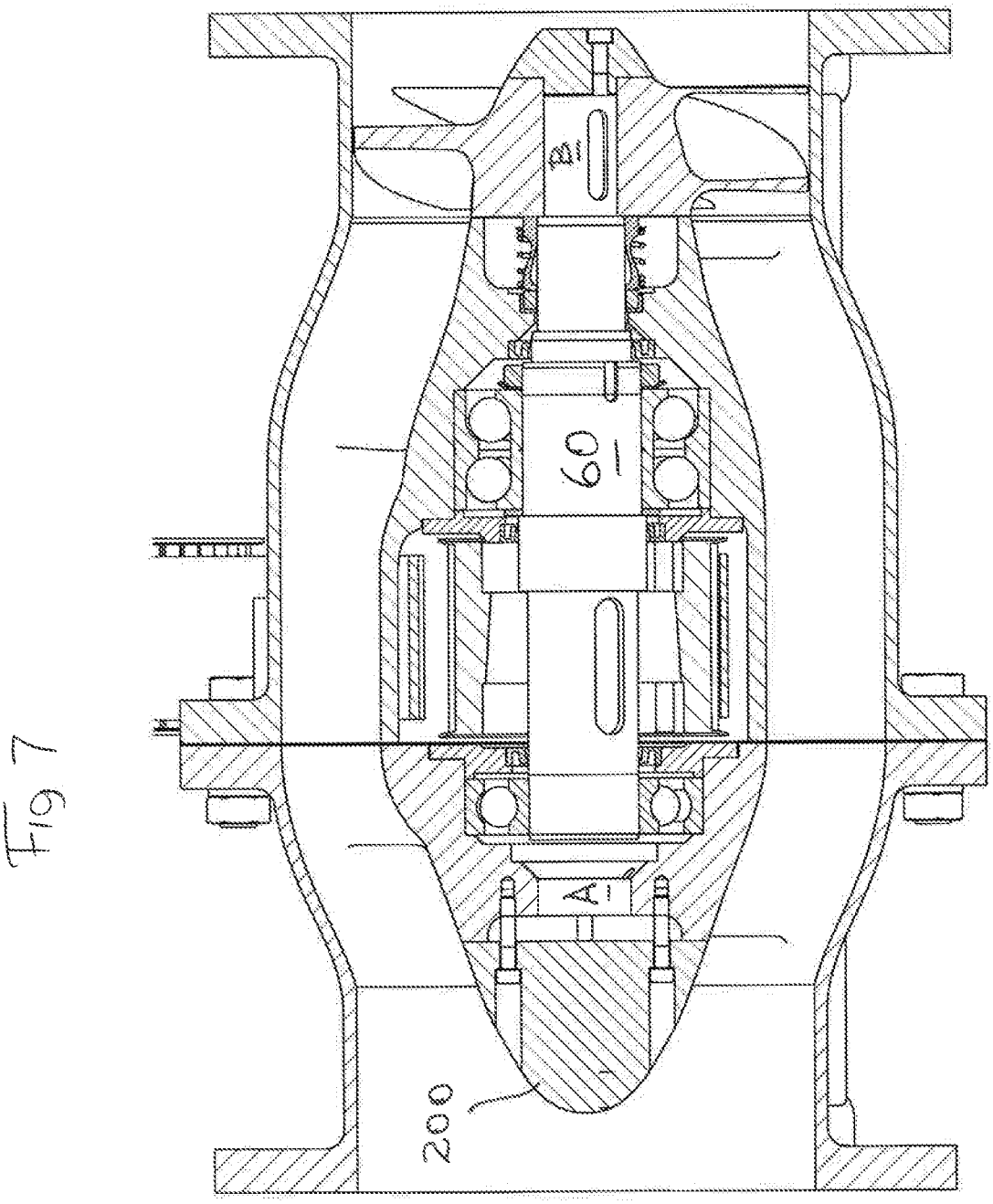


Fig 7

REFERENCES CITED IN THE DESCRIPTION

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